Benjamin G. Pierce

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RESEARCH INTERESTS

Photovoltaics **Machine Learning** **Computer Vision** **High-Performance Computing**

EDUCATION

Case Western Reserve University
Aug 2017 – May 2021
B.S. Computer Science
Cleveland, OH

- Advisor: Roger H. French
- Coursework: Algorithms, Databases, Machine Learning, Theoretical Computer Science, Cryptology, Linear Algebra, Probabilistic Graphical Models, High Performance Computing, Computational Perception

EXPERIENCE

Sandia National Laboratories
Member of the Technical Staff (2021-Present)
Student Intern (2020-2021)
Albuquerque, NM

- Devised novel control algorithms for single axis trackers (SATs), resulted in submitted patent application
- Used sky images and novel sensors to forecast and nowcast cloud coverage and irradiance for SATs.
- Modeled PV performance for continental US for factors including terrain slope, shading, and degradation.
- Used Sandia High Performance Computing clusters to accelerate R&D for multiple projects.

Solar Durability and Lifetime Extension Center
Aug 2018 – May 2021
Research Assistant
Cleveland, OH

- Used image processing to find the rate of crystallization of AlN on a molten Al-Ni alloy.
- Utilized unsupervised machine learning to sort electroluminescence images based on defects and/or damage.
- Investigated electrical impact of cracks on Si PV cells.
- Supported and maintained research group high performance computing infrastructure.

PUBLICATIONS

- M. Adachi, S. Hamaya, D. Morikawa, **B. G. Pierce**, A. M. Karimi, Y. Yamagata, K. Tsuda, R. H. French, H. Fukuyama, "Temperature dependence of crystal growth behavior of AlN on Ni-Al and demonstration of thick AlN film growth using electromagnetic levitation and computer vision technique" in Materials Science in Semiconductor Processing, 1/1/2023 [Online]
- **B. G. Pierce**, J. L. Braid, J. S. Stein, and D. Riley, "Cloud Segmentation and Motion Tracking in Sky Images," IEEE J. Photovoltaics, Accepted 10/172022
- **B. G. Pierce**, J. L. Braid, J. S. Stein, J. Augustyn, and D. Riley, "Solar Transposition Modeling via Deep Neural Networks With Sky Images," IEEE J. Photovoltaics, 11/22/2021 [Online]
- C. M. Whitaker, **B. G. Pierce**, R. H. French, and J. L. Braid, "Properties of PV Cell Fractures and Effects on Performance of Al-BSF and PERC Modules," in IEEE 48th Photovoltaic Specialists Conference, 6/6/2021 [Online]

- **B. G. Pierce**, A. M. Karimi, J. Liu, R. H. French, and J. L. Braid, "Identifying Degradation Modes of Photovoltaic Modules Using Unsupervised Machine Learning on Electroluminescence Images," in 2020 47th IEEE Photovoltaic Specialists Conference, 6/15/2020 [Online]
- C. M. Whitaker, **B. G. Pierce**, A. M. Karimi, R. H. French, and J. L. Braid, "PV Cell Cracks and Impacts on Electrical Performance," in 47th IEEE Photovoltaic Specialists Conference, 6/15/2020 [Online]

INTELLECTUAL PROPERTY

- "Systems and Methods for Single-Axis Tracking via Sky Imaging and Machine Learning", Benjamin G Pierce, Joshua S Stein, Jennifer L Braid, Daniel Riley, U.S. Provisional Patent Application, Ser. No. 63/126,708, filed December 17, 2020.

AWARDS

DOE Science Undergraduate Laboratory Internships (SULI) — Lawrence Berkeley National Lab
Offered SULI funding for Summer 2020, declined for Sandia — May 2020

Computer and Data Sciences Research Award — CWRU
To the graduating senior demonstrating exceptional research potential — May 2021

Herbold Scholar — CWRU
Awarded funding for Master's program at CWRU, declined for full-time position at Sandia — May 2021

IEEE PVSC 2022 Session Chair — IEEE PVSC
Co-chair for Solar Resource and PV Forecasting, Session II — June 2022

TECHNOLOGIES

Programming Languages	Python, R, Julia, C, Java, bash
Libraries	PyTorch, TensorFlow, NumPy, sklearn, pandas, pvlib-python
Laboratory Equipment	Eternalsun Spire, electro/photoluminescence, SunsVoc, oscilloscopes, etc.
Databases	Hadoop2/Hbase, MySQL, MS SQL Server
Other	High-performance computing, LaTeX

ACTIVITIES

Association for Computing Machinery	Student Member, 2019
Institute of Electrical and Electronics Engineers	Student Member, 2020
Study Abroad	Cape Town, South Africa, Summer 2018
Volunteer Correspondent	Prison Mathematics Project, Summer 2021-